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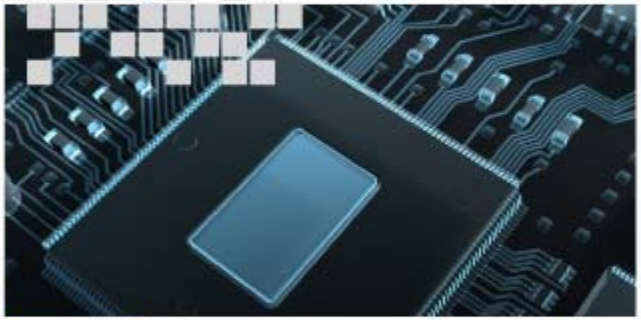
ENERGY STAR for Servers Tier 2



Henry M.L. Wong, The Green Grid Representative

Agenda

- The Green Grid
- Tier 2 Development Areas
  - Performance Keys Efficiency
  - Focus Areas to Integrate the Tools
  - Additional Areas to Improve Upon Tier 1
- Summary

The Green Grid

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- A global consortium dedicated to advancing energy efficiency for data centers and business computing ecosystems by:
  - Defining meaningful, user-centric models and metrics
  - Developing standards, measurement methods, best practices and technologies to improve performance against the defined metrics
  - Promoting the adoption of energy efficient standards, processes, measurements and technologies

Performance Keys to Efficiency

SM

- **Server Energy Efficiency**
  - **Maximize output….. Within the power envelope**
  - **ENERGY STAR evaluation metric should factor in performance**
- **Measurement Tools – scale to the variety of configurations within a category.**
  - Our Tier 2 Development Challenges
    - PSU alternate methodology (net-loss) under consideration
    - An Idle-only metric does not factor in performance
  - Recommend:
    - Power Supply Efficiency: Continue with CSCI* efficiency targets.
    - Incorporate performance into evaluation tools that:
      - Stress and scale with the hardware (likely to be synthetic code)
      - Blend of common server workloads, which may not represent any specific application
      - Be O/S and Hypervisor portable (run on variety of)
      - Be architecturally portable (run on variety of architectures and platforms)
      - Accessible to all Energy Star manufacturing partners
      - Incorporate feasibility to be conducted by both system manufacturers and/or qualified 3rd party laboratories

*CSCI= Climate Savers Computing Initiative

Focus Areas to Integrate the Tools

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- **Scope and Categories-** Identification and grouping of systems to be assessed in Tier 2

  - Our Tier 2 development challenges
    - Prioritize volume general purpose systems
    - Avoid mixed incentives
    - Increase focus on key efficiency attribute: Work for the energy allocated

  - TGG recommends grouping clarification and prioritization of the systems in scope for Tier 2
    - Improve the taxonomy and definition of systems.
    - Group by socket and by form factor
    - Prioritize: 1S, 2S, 4S systems; blades, racks and pedestals.

Focus Areas to Integrate the Tools (cont.)

- **Pre-specification data collection** allows the EPA to determine compliance limits and adjustments
  - Our Tier 2 development challenges: confirm the metric coverage across configurations and determine adjustments that may be needed.
  - TGG recommends: develop a list of platform power sensitivities in addition to SPEC tool information to collect data on.
    - Performance value scaling to hardware changes
    - Statistical data collection on memory, I/O, RAS, management

Additional Areas to Improve Upon Tier 1

- **Product-family-definition and compliance-testing's** ability to represent a group of products that would be considered compliant.
  - Our Tier 2 development challenges for a product family:
    - Compliance testing and reporting ("family"/SKUs) is unclear
    - Address scaling limitations of the assessment tools
    - "As-shipped" does not reflect the installed configuration. VARs.
    - Alternate verification methods without having to test end user installations
  - TGG recommend product family definitions and compliance testing methods should be updated comprehending the challenges above.

Additional Areas to Improve Upon Tier 1 (cont.)

- **Power Performance Data Sheet** should be a common datasheet format that describes the power and performance characteristics of the server. Information aids IT managers to right size the provisioning plans.
  - Our Tier 2 development challenges:
    - Power and performance vary based on configurations and applications
    - Should not include the E* rating value
  - Recommend that the power performance datasheet contain only parameters that will actually be used to provision the datacenter. Move information only pertinent to the compliance testing to QPI form.

Additional Areas to Improve Upon Tier 1 (cont.)

- The **data measurement and output requirements** provides common environmental and usage condition information to users to encourage system management.
  - Our Tier 2 development challenges:
    - Temperature: location, response time, accuracy inconsistent with ability to control or change.
    - Power: built in requirements to the PSU not available on all supplies. Monitoring different rails, aggregating, and subsequent controls may be problematic.
  - TGG recommends: Adjust the reporting requirements to reflect the accuracy levels and reporting intervals that's consistent with the monitors and controls needed by data center operators.

Summary
Key Targets for Tier 2 Development

SM

- **Incorporate performance to power level testing**
  - Synthetic evaluation tool to cover wider variety of configurations and system capabilities
  - Pre-specification data collection
  - Augmentation of the tools to scale to the hardware configurations

- **Prioritize Tier 2 scope on 1S-4S, rack, pedestal and blade servers.**
  - Address specialized configurations and systems at a later time.

- **Additional Areas to Improve Upon Tier 1:**
  - Power Performance Datasheet separate from QPI
  - Electronic system monitors reflect data center control resolution requirements.

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Backup

For more information:
www.thegreengrid.org

The Green Grid Initiatives:
Creating a framework for best practices

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- Create shared definitions, benchmarks and metrics to enable real-time measurement monitoring and control of data center efficiency and productivity
- Create baseline 'state-of-the-industry' documentation including benchmark architectures and a repository of data center efficiency knowledge
- Create a comprehensive technology roadmap for future data center design to maximize efficient and productive operations
- Assess new and alternate data center technologies
- Monitor progress on all fronts and provide periodic updates

Taxonomy of Platform Evaluation Tools

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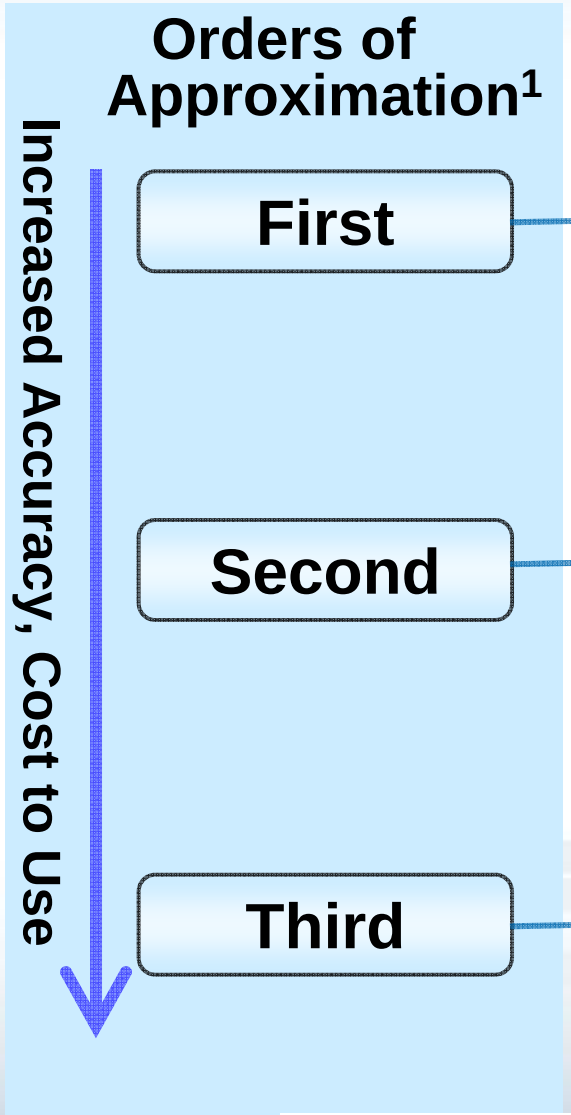

Generalized Evaluation Tools
- Architecture Agnostic
- Usually Synthetic
- Represents Multiple Environments
- Software Selection & Tuning Prohibited
- Consistent, Repeatable Results
- Low Cost to Use

Standard Benchmarks
- Usage Categories
- Architecture Agnostic
- Represents Generic App Environment
- Software Selection/Tuning "Open"
- Consistent, Repeatable Results
- Moderate to High Cost to Use

Application Benchmarks
- Usage Specific
- Architecture Dependent
- Represents Specific Environment
- Software Selection/Tuning Limited
- Consistent, Repeatable Results
- High Cost to Use

1. The State of Energy and Performance Benchmarking for Enterprise Servers; A. Fanara, E. Haines, A Howard; August 2009

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